VIII.—THE FAUNA OF BRACKISH PONDS AT PORT CANNING, LOWER BENGAL

PART IV.—HYDROZOA.

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Only one species of Hydrozoon, *Irene ceylonensis*, occurs at present in the ponds themselves, but two others have been found in one of the small pits close to the embankment of the river, and might easily be carried into the ponds by a flood. As the smaller pits dry up completely before the end of winter, the presence in them of these hydroids is probably accidental, coming about only when the embankment is broken and water enters from the estuary, bringing with it eggs, larvæ or medusæ. Considering the three species found in brackish water at Port Canning together, *Irene ceylonensis* is the only representative of the Calyptoblastea, the two from the pit being both Gymnoblastic; of these latter, one is an undescribed species of *Syncoryne* or possibly of a new genus, while the other must be regarded at present as identical with the European *Bimeria vestita*, from which, however, further research may ultimately prove it specifically distinct.

Syncoryne filamentata, sp. nov.

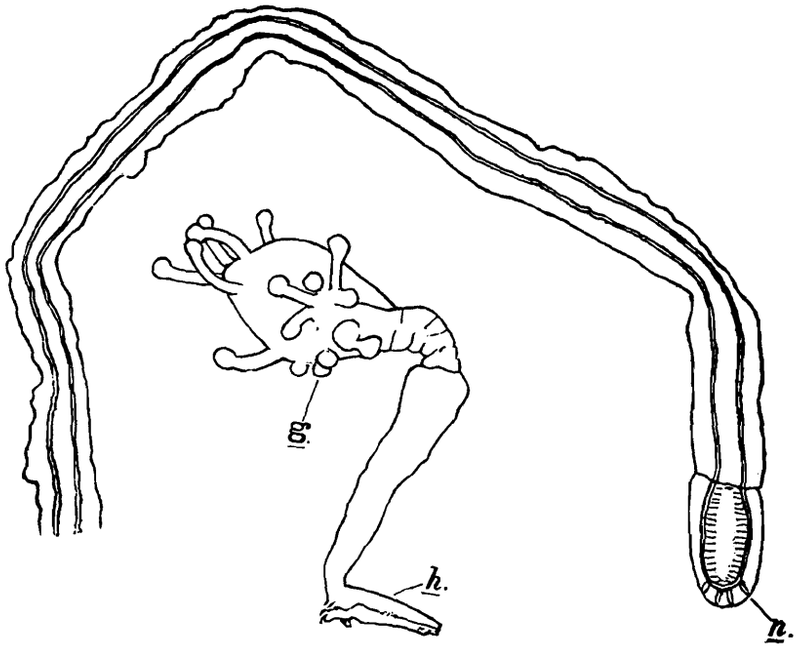

FIG. 1.—Trophosome of *S. filamentata*, × 21. Hydranth and free filament (the latter in optical section). n = nematocyst: g = gonosome: h = hydrorhiza.

Trophosome—

Colony glistening white in colour. Hydrorhiza branches sparingly, does not anastomose, gives rise at intervals to single upright polyps, and is produced at the extremities of the ultimate branches into long, free filaments, the distal ends of which are often slightly

clubbed. The stem of the hydranths is obscurely annulated, their bases are surrounded by loose sheaths of the perisarc. The distal extremity of the filaments is free from the perisarc and contains nematocysts in the ectoderm. The hydranths are spindle-shaped and bear ten to fourteen capitate tentacles, which are arranged in two distinct whorls.

Gonosome—

The medusæ are borne only at the base of the inferior whorl of tentacles on the hydranths; they are minute, subquadrate in transverse section, somewhat elongate, regularly and profusely tuberculate externally, colourless. The manubrium is conical, short, incapable of being extended as far as the opening of the bell; the velum extensive; the four tentacles short and stout, capitate, without swellings except at the extremities. (This description refers only to the young medusæ before the appearance of the gonads for the later stages have not been observed.)

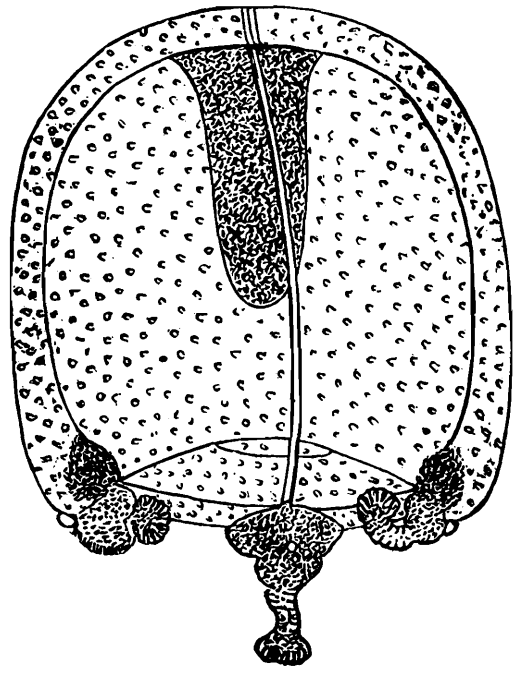

FIG. 2.—Young free gonosome of *S. filamentata*, highly magnified.

I found only one example of this species; it surrounded a grass-stem at the edge of the pit in which the next form was also taken. The spaces left vacant between the branches were filled by large numbers of a gregarious Vorticellid Protozoon, the bases of the individuals of which were inserted in a common covering of mucus and sand grains. Numerous medusæ were set free in a glass of water in December and were kept under observation for two days, at the end of which they died. Their manubria appeared to be imperforate and their tentacles remained short and stout. They moved through the water both vertically and horizontally by regular pulsations of the bell. Some specimens were killed and preserved in two per cent. formol; they became longer in proportion to their

girth than was the case with living individuals in a position of rest, owing to the fact that they died with the velum in a state of contraction. The figure (fig. 2) was drawn from a living specimen; it represents the tubercles on the external surface as rather larger and more conspicuous than they really are, and only shows one of the four radial canals.

The free filaments of the trophosome are flaccid and incapable of independent movement.

Bimeria vestita, Wright.

From bricks in the river at Port Canning and from a pit of brackish water at the same place; previously recorded from northern Europe and South America.

My specimens differ in one important character from those described from Europe, namely in the extent and nature of the chitinous investment of the perisarc. Allman (*Mon. Gymn. Hydr.*, p. 298) describes "the chitinous sheaths which invest the bases of the tentacles" as "suggesting the idea of a half-gloved hand" and being of a brown colour. This is not the case in the specimens from Port Canning, in which the perisarc is of a pale horn-colour and the chitin disappears at the base of the tentacles so gradually that it is impossible to say exactly at what point it ceases. In specimens from the Matla, however, it is darker and extends further upwards than in the one from the pit. Torrey (*Pub. Univ. California*, Zool., i, p. 27) has pointed out that the extent and thickness of the chitinous perisarc, which was formerly regarded as a generic character separating *Bimeria* from *Garveia*, is liable to considerable variation in North American species, of which several have been described. Another but less noteworthy point in which my specimens differ from the typical form, is the irregular and often indistinct annulation of the stalks of the gonosomes; but

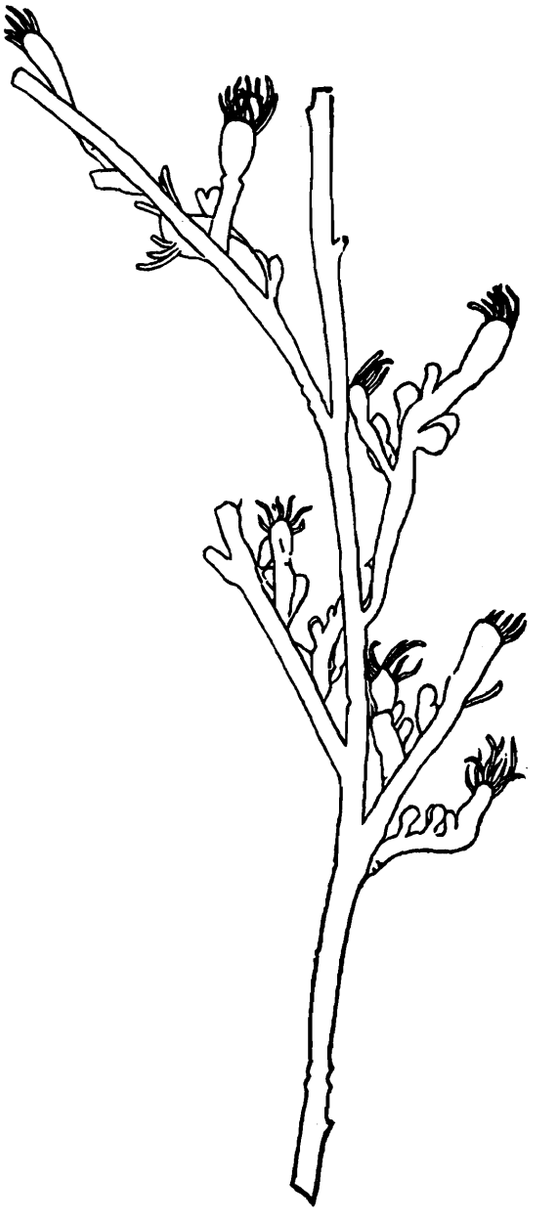

FIG. 3.—*B. vestita*; part of a colony from pit of brackish water, Ganges delta, × 16.

this cannot be regarded as a constant character. Judging from Hartlaub's figure (*Zool. Jahrb.*, 1905, suppl. vi, p. 534), his South American specimens represented a depauperated form. The Port Canning colonies, however, are vigorous, the upright stems branching freely and attaining a height of about 15 mm. All the gonosomes (in December) were female, each bearing a single egg, round which the spadix, which was simple, had coiled itself.

Irene ceylonensis, Browne.

From one of the brackish ponds at Port Canning; the medusa originally described from off the coast of Ceylon.

Trophosome—

Colony minute, barely visible to the naked eye, colourless; perisarc extremely delicate. Hydrorhiza strongly adherent, branches sparingly, does not anastomose, gives rise at intervals to single upright polyps. Hydrotheca nearly cylindrical, with a short pedicel, which is about one-seventh as long as the cup and bears more or less distinct annulations; an operculum present, consisting of a number of triangular flaps which close together above the contracted hydranth. Hydranths highly contractile, with about fourteen tentacles, which are capable of great elongation; the disk shallow; the hypostome inconspicuous.

Gonosome—

Gonosome borne on a long, more or less distinctly annulated stalk, which as a rule carries a single medusa. Two or more younger medusæ are, however, occasionally produced at the base of and at right angles to the first, the main axis of which is that of the pedicel. Each medusa is contained in a separate gonotheca, which is ovoid variable in size, always larger than the hydrotheca, and has a single aperture produced by the rupture of the membrane above; the gonophore is a simple cylindrical body. Medusa at first almost hydra-like in appearance, with the umbrella feebly developed and with four stout, tapering tentacles, by means of which progression is effected. Adult medusa measuring 20—25 mm. in diameter, the depth of the bell being less than the breadth. No cirri; tentacles about 100, some of them often represented by small tubercles; otoliths from one to four in each sense-organ, a sense-organ occurring between each pair of tentacles; four radial canals; manubrium stout, conical, colourless; stomach small; mouth surrounded by four fringed lobes; gonads colourless, consisting of linear bands and extending when mature from the base of the manubrium to the periphery of the bell.

FIG. 4.—Gonotheca of *I. ceylonensis*, × 140.

The whole perisarc of the hydroid of this species is so delicate that the thecæ can only be seen with difficulty even in the living colony; in preserved specimens their outlines are always distorted. The constant presence among them, in the pond, of the very much stouter and less transparent thecæ of the Protozoon *Folliculina ampulla* was at first a source of confusion to me, until I saw both organisms expanded.

The gonosomes are produced in November, December and January. At the beginning of December (1906) the medusæ in the pond were still immature, although many of them had almost attained their full size; towards the end of the same month their gonads were ripe, while at the beginning of the next month only dead or dying medusæ could be found. By March 17th another brood had reached maturity, having probably been produced by the young gonophores observed on the colonies in January. In March, however, no hydroids were found; probably they had been killed by the increased temperature of the water, which was perceptibly warm to the hand in the middle of the day. In my aquarium they soon perished unless the glass was shaded from the direct rays of the sun. Neither medusæ nor hydroids could be found in the pond at the end of May.

A peculiarity, which may have been due to the rise in temperature, was noted in the March brood of medusæ. Those which reached maturity in December agreed with the original specimens from Ceylon in not having more than two otoliths in each sense-organ, but those taken in March had either three, four, six or eight. When three or four were present, they were arranged in a single series approximately at right angles to the periphery of the bell; but when the number was six or eight, they formed two parallel series oriented in the same manner. In some instances it was possible to see that the otoliths of smaller series were actually dividing to produce larger ones, the direction of division being always the main axis of the series. The size of the cyst was always larger when six or eight otoliths were present, and in several cases a partition had been formed between the two parallel series, dividing the cyst into two compartments. It was clear, therefore, that the cysts were multiplying by fission. Numerous new tentacles were also being produced, every stage occurring between small rounded swellings of the periphery and fully elongated tentacles. Browne (in Herdman's *Ceylon Pearl Oyster Fisheries and Marine Biology*, part iv, p. 140) remarked on these swellings and suggested that they were young tentacles, as has proved to be the case. He also observed that while the normal number of otoliths in a cyst was one, two were sometimes present. He thought it probable that this was a case of twinning, but in the light of the observations just recorded it seems more probable that it was one of division.

I have commented in the preliminary paper of this series on the survival of both hydroid and medusa in small masses of water from which a fresh supply of air was practically excluded. This was as noticeable in the March brood of medusæ as in the December one.

I did not find, however, that individuals of either brood lived for more than a few days in my aquarium, although they fed readily. Judging from the succession of broods in the pond, the life of the medusa, as might be expected, is short; while the hydroid probably does not survive for more than one cold season.

The medusæ are sluggish in their movements. As a rule they do not swim at the surface but rise up to it occasionally by a rapid succession of pulsations, and then sink again with the dorsal surface of the umbrella downwards. On reaching the bottom they generally lie still for a few minutes and then rise obliquely sufficiently high to right themselves. When this has been effected, they often make another ascent to the surface, and the manœuvre may be carried out several times in succession. While they are sinking, the velum remains expanded and the tentacles maintain their position parallel to the longitudinal axis of the bell, except when they become entangled together. The manubrium is, however, in almost constant motion, twisting in all directions and apparently removing microscopic particles from the tentacles and the ventral surface of the velum. Occasionally the medusæ move through the water obliquely for a short distance by a regular series of slow pulsations, and more frequently they float along just above the bottom, on which the tentacles and manubrium trail, in an upright position.

Although the tentacles may be used in retaining microscopic organisms, which the manubrium removes from them, larger prey is captured directly by the mouth, which picks it up from the bottom. I have on several occasions observed young examples of the small univalve mollusc *Bithinella caningensis*, Preston, which is enormously abundant in the ponds, being seized in this way. A long struggle always ensued before the medusa was able to detach and lift the prey, which, however, was finally taken into the stomach, distending it greatly. The empty shell was ejected after a few hours. Another method of feeding was also observed, in this case on a filamentous alga. The medusa attached itself by its mouth to a filament of the alga and sucked out the contents, its stomach becoming perceptibly green in the process, which lasted for some hours.

These observations were of course made on captive specimens, but there is no reason to think that the actions recorded were in any way abnormal; so little is known about the movements and feeding of medusæ that any notes of the kind have considerable interest. I could not detect evidence of either negative or positive heliotropism in the medusæ, but their powers of progression are so feeble that perhaps this was hardly to be expected. Their position in the pond appeared to be due entirely to the direction of the wind; if there was no wind, they remained close to the plants of *Nais* on which the hydroid was growing, and on which *Bithinella* was very abundant.